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Tree Pest Leaflets

THE EUROPEAN SPRUCE SAWFLY

(*Diprion polytomum* Hartig)

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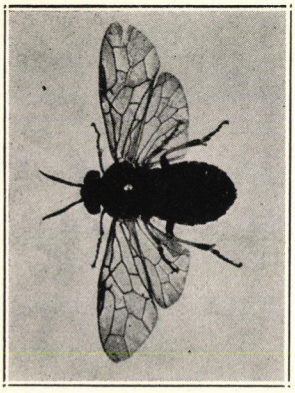

Fig. 1

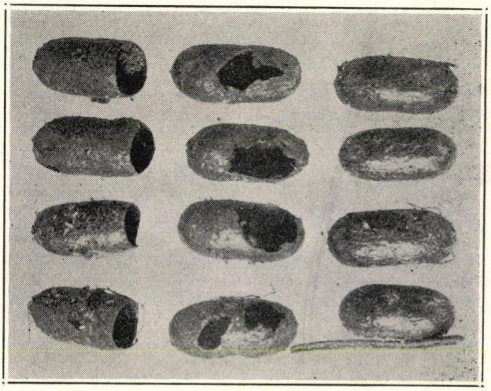

Fig. 3

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(*Diprion polytomum* Hartig)

History and Distribution.

The European spruce sawfly, which is a relatively harmless insect in Europe, has been present in northeastern North America for some years. Since 1930 heavy defoliation has occurred in the Gaspe Peninsula, Quebec, and Dr. Balch, of the Dominion Entomological Branch, has estimated that over half the volume of white spruce and nearly a quarter of the volume of the black spruce in the infested areas are already dead. Also, an appreciable additional amount of both species will die. An extensive survey conducted in 1935 by the Bureau of Entomology and Plant Quarantine showed that this insect is present all over the northeastern part of the United States as far south as Long Island Sound and as far west as western New York. The earliest record in the United States is from Mount Washington, N. H., in 1929. Larvae collected in the Adirondack Mountains, N. Y., in 1931 have recently been determined, at the New York State College of Forestry, as of this species. The heaviest infestations found in the United States, during 1935, were in northwestern Connecticut and in the Adirondack region.

Host Trees.

The larvae are known to feed upon white spruce (*Picea glauca* (Moench) Voss), red spruce (*P. rubra* Link), black spruce (*P. mariana* (Mill.) B. S. P.), Norway spruce (*P. excelsa* Link), and Colorado blue spruce (*P. pungens* Engelm.). Undoubtedly other species of spruce also, if planted in the region, will be attacked.

Rate of Spread.

The further spread of the insect to the south and west will depend largely on the prevalence of planted spruce, both in plantations and as individuals, although the native red spruce grows in the southern Appalachian region on the higher slopes. Canadian studies indicate that the adults can fly considerable distances, especially if aided by the wind.

Description of Insect and Life History.

The adult female (Fig. 1) has four wings, is rather stout, and is black with yellowish markings on the abdomen, thorax, and front of the head. Up to the present time males have not been found in the United States, and reproduction is, therefore, parthenogenetic. The eggs, which are laid singly in slits in the old needles, are about one-twelfth inch long. They hatch in about a week and the larvae begin feeding, usually at the tips of the needles.

There are six instars, or periods between molts, during the larval existence. The first- and second-instar larvae are about one-eighth inch long, but the body in the second instar is a little thicker. They gradually increase in length until at the end of the fifth instar they average

about four-fifths of an inch. The larvae are light green, and in the fourth and fifth instars five narrow longitudinal white lines are clearly discernible. (Fig. 2). They have, in addition to the 3 pairs of true legs, 8 pairs of abdominal prolegs, and this readily distinguishes them from moth larvae, which have from 2 to 6 pairs. The resemblance of the larvae, in all instars, to the needles renders them very inconspicuous and in a light infestation it is difficult to see even the large ones. Their presence can best be discovered by jarring the limbs and catching the

Fig. 2

larvae on a sheet spread under the tree. The white lines disappear in the sixth and last instar and the body becomes shorter and more robust.

The change to the pupa and the adult takes place in a smooth golden to dark-brown cocoon which is about two-fifths of an inch long. (Fig. 3). This cocoon is spun in the litter beneath the trees, although rarely larvae of the summer generations may spin their cocoons on the twigs as is the case with the second generation in Europe. In the Gaspe region there is one generation annually and in New Brunswick two and under favorable weather conditions a partial third. In northern Maine there probably is one generation, and in the rest of

New England at least two. In the southern part of the known range of the insect there may be as many as three generations, and under favorable weather conditions a partial fourth.

As a general rule the larvae feed on the old needles, but when the needles of the current season have matured these also will be eaten. Defoliation is usually heavier in the lower part of the crown and heavy feeding causes a distinctly thinned appearance. The larvae feed singly at all times, and most of the feeding damage occurs in the fourth and fifth instars. Canadian studies have shown that complete or nearly complete defoliation is necessary to kill the average spruce tree, but even then, in many cases, death will not occur for several years. All sizes and ages of spruce are attacked.

Control.

As both natural and planted stands are equally susceptible, reduction of damage in forested areas by silvicultural practices does not appear promising.

Parasites.

The liberation of parasites before the infestation becomes severe seems to offer the best hope that heavy damage may be prevented. Colonies have already been liberated in northern Maine, two in Connecticut, and one in northern New York. More work will be done on this phase of the problem in 1936, but the work is still in the experimental stage and no recoveries have been made.

Predators.

The common soldier bugs have been observed feeding on the sawfly larvae. Shrews and ground-feeding rodents, squirrels, and probably ground-feeding birds destroy considerable numbers of the cocoons in the litter.

Weather Conditions.

Freezing temperatures during the latter part of November 1935 killed the larvae of the fourth generation in southern Connecticut. Unfavorable conditions undoubtedly account for the destruction of large numbers of the larvae.

When an infestation is present, ornamental trees can be protected by spraying with acid lead arsenate, at the rate of 3 pounds to 100 gallons of water, with about 4 fluid ounces of fish oil or linseed oil added for each pound of lead arsenate as a sticker.

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